

CLAIMS

1. A storage-stable modified asphalt composition, which comprises:

base asphalt	50-97.7 parts by weight;
polymer having double bonds	2.0-20.0 parts by weight;
compatilizer	0.1-20.0 parts by weight;
cross-linking reagent	0.1-10.0 parts by weight;
organic polar compound	0.1-10.0 parts by weight

 and the softening point difference of its product determined by the

10 stability test is lower than 2.5°C.
2. The modified asphalt composition according to claim 1, wherein said base asphalt is one selected from the group consisting of petroleum asphalts, coal-tar asphalts, tar sand asphalts, and native asphalts, or a mixture thereof, wherein the petroleum asphalt is one selected from the group consisting of straight-run

15 asphalts, asphalts obtained by solvent deasphalting, oxidized asphalts, and blended asphalts, or a mixture thereof.
3. The modified asphalt composition according to claim 1, wherein said polymer having double bonds is a block polymer of styrene and butadiene in a ratio of 20-45:80-55.
- 20 4. The modified asphalt composition according to claim 1, wherein said compatilizer is one selected from the group consisting of styrene tar, tall oil, acid-containing tall oil, catalytically cracked oil slurry, heavy deasphalted oil, extracted oil obtained by solvent refining, naphthenic acid, naphthenic oil, white oil, and coal tar fractions, or a mixture thereof.
- 25 5. The modified asphalt composition according to claim 1, wherein said cross-linking reagent is one selected from the group consisting of crystallized sulfurs, activated sulfurs, sulfur-donors, and "symbolizing" sulfur-donating cross-linking reagents, or a mixture thereof.
6. The modified asphalt composition according to claim 5, wherein said

30 activated sulfur is a sulfur powder, a colloidal sulfur, or a mixture thereof, and said colloidal sulfur is a colloid with an average diameter of 1-5 μm prepared by

2025 RELEASE UNDER E.O. 14176

mixing sulfur powder or precipitated sulfur with a dispersion reagent and then grinding.

7. The modified asphalt composition according to claim 5; wherein said sulfur donor is one selected from the group consisting of sulfur-containing morpholinium compounds, thiuram compounds, and polysulfides, or a mixture thereof.

8. The modified asphalt composition according to claim 5, wherein said "symbolizing" sulfur-donating cross-linking reagent is a divalent metal oxide cross-linking reagent.

9. The modified asphalt composition according to claim 1, wherein said organic polar compound is one selected from the group consisting of amine, acid, phenolic resin, and aldehyde compounds, or a mixture thereof.

10. The modified asphalt composition according to claim 9, wherein said amine compound is one selected from polyactene polyamine compounds, wherein the polyactene comprises di-, tri- and tetraethylene; and the polyamine comprises hexamethylene diamine, tetramine, penta-amine, or a mixture thereof.

11. The modified asphalt composition according to claim 9, wherein said acid compound is one selected from carboxylic acid, acid anhydride, sulfonic acid, boric acid, and phosphoric acid compounds, or a mixture thereof.

12. The modified asphalt composition according to claim 11, wherein said phosphoric acid compound is one selected from polyphosphoric acid, phosphorous acid, modified phosphoric acid, and phosphate compounds, or a mixture thereof.

13. The modified asphalt composition according to claim 9, wherein said phenolic resin compound is one selected from formaldehyde alkylphenol resin compounds, wherein the alkyl is *p*-tert-butyl or *p*-tert-octyl paraffinic group.

14. The modified asphalt composition according to claim 13, wherein said alkyl is the polar hetero-atom containing alkyl, and said formaldehyde alkylphenol resin comprises formaldehyde phenol resin having sulfur or oxygen atom containing alkyl.

15. The modified asphalt composition according to claim 9, wherein said aldehyde compound is one selected from the group consisting of glycidic

aldehyde, formaldehyde, binary aldehydes, and furfural, or a mixture thereof, wherein the binary aldehydes are *p*-phthalic aldehyde and its derivatives or *m*-phthalic aldehyde and its derivatives.

16. A process for preparing the storage-stable modified asphalt composition according to claim 1, which comprises mixing 50-97.7 parts by weight of a base asphalt, 2.0-20.0 parts by weight of a polymer having double bonds, 0.1-20.0 parts by weight of a compatilizer, 0.1-10.0 parts by weight of a cross-linking reagent, and 0.1-10.0 parts by weight of a organic polar compound under certain conditions.

17. The process according to claim 16, wherein said compatilizer can be first mixed with the base asphalt, or with the polymer having double bonds, or with the mixture of the polymer having double bonds and the base asphalt; or said compatilizer can be added at last, and said compatilizer can be added either once or twice.

18. The process according to claim 16, wherein said base asphalt can be added either once or twice.

19. The process according to claim 16, wherein said process comprises the following steps:

(1) contacting the base asphalt with the compatilizer at 100°C-250°C for 0.1-6 h to yield the treated base asphalt;

(2) mixing the treated base asphalt with the polymer having double bonds for 0.1-10 h to yield the asphalt mother liquor;

(3) adding the cross-linking reagent, organic polar compound, and optional base asphalt to the asphalt mother liquor at 100°C-250°C to react for 5-300 min, yielding the modified asphalt composition;

wherein the weight ratio of the base asphalt in step (3) to that in step (1) is 0-50:100-50.

20. The process according to claim 16, wherein said process comprises the following steps:

(1) contacting the base asphalt with the compatilizer at 100°C-250°C for 0.1-6 h to yield the treated base asphalt;

(2) mixing the treated base asphalt with the polymer having double bonds for 0.1-10 h to yield the asphalt mother liquor;

(3) adding the cross-linking reagent, organic polar compound, and optional compatilizer to the asphalt mother liquor at 100°C-250°C to react for 5-300 min,

5 yielding the modified asphalt composition;

wherein the weight ratio of the compatilizer in step (3) to that in step (1) is 0-50:100-50.

21. The process according to claim 16, wherein said process comprises the following steps:

10 (1) mixing the base asphalt at 100°C-250°C with the polymer having double bonds for 0.1-10 h to yield the asphalt mother liquor;

(2) contacting the asphalt mother liquor at 100°C-250°C with the compatilizer at 100-250°C for 0.1-6 h to yield the treated asphalt mother liquor:

(3) adding the cross-linking reagent, organic polar compound, and the
15 optional base asphalt to the treated asphalt mother liquor to react for 5-300 min, yielding the modified asphalt composition;

wherein the weight ratio of the base asphalt in step (3) to that in step (1) is 0-50:100-50.

22. The process according to claim 16, wherein said process comprises the
20 following steps:

(1) contacting 2.0-20.0 parts by weight of a polymer having double bonds with 0.1-20.0 parts by weight of a compatilizer at 10°C-250°C for 0.1-72 h to yield the treated polymer having double bonds;

(2) heating 50-97.7 parts by weight of the base asphalt to 100°C-250°C;

25 (3) mixing the treated polymer having double bonds with the heated asphalt for 0.1-6.0 h to yield an asphalt mother liquor, and maintaining the temperature of the asphalt mother liquor at 100°C-250°C;

(4) adding 0.1-10.0 parts by weight of the cross-linking reagent and 0.1-10.0 parts by weight of the organic polar compound into the asphalt mother liquor to
30 react for 5-300 min, yielding the modified asphalt composition.

23. The process according to anyone in claims 16 to 22, wherein said base

asphalt is one selected from the group consisting of petroleum asphalts, coal-tar asphalts, tar sand asphalts, and native asphalts, or a mixture thereof, wherein the petroleum asphalt is one selected from the group consisting of straight-run asphalts, asphalts obtained by solvent deasphalting, oxidized asphalts, and blended
5 asphalts, or a mixture thereof.

24. The process according to anyone in claims 16 to 22, wherein said polymer having double bonds is a block polymer of styrene and butadiene in a ratio of 20-45:80-55.

25. The process according to anyone in claims 16 to 22, wherein said
10 compatilizer is one selected from the group consisting of styrene tar, tall oil, acid-containing tall oil, catalytically cracked oil slurry, heavy deasphalted oil, extracted oil obtained by solvent refining, naphthenic acid, naphthenic oil, white oil, and coal tar fractions, or a mixture thereof.

26. The process according to anyone in claims 16 and 19 to 22, wherein said
15 cross-linking reagent is one selected from the group consisting of crystallized sulfurs, activated sulfurs, sulfur-donors, and "symbolizing" sulfur-donating cross-linking reagents, or a mixture thereof.

27. The process according to claim 26, wherein said activated sulfur is a sulfur powder, a colloidal sulfur, or a mixture thereof, and said colloidal sulfur is a
20 colloid with an average diameter of 1-5 μm prepared by mixing sulfur powder or precipitated sulfur with a dispersion reagent and then grinding.

28. The process according to claim 27, wherein said sulfur donor is one selected from the group consisting of sulfur-containing morpholinium compounds, thiuram compounds, and polysulfides, or a mixture thereof.

25 29. The process according to claim 26, wherein said "symbolizing" sulfur-donating cross-linking reagent is a divalent metal oxide cross-linking reagent.

30. The process according to anyone in claims 16 and 19 to 22, wherein said organic polar compound is one selected from the group consisting of amine, acid, phenolic resin, and aldehyde compounds, or a mixture thereof.

30 31. The process according to claim 30, wherein said amine compound is one selected from polyactene polyamine compounds, wherein the polyactene

comprises di-, tri- and tetraethylene; and the polyamine comprises hexamethylene diamine, tetramine, penta-amine, or a mixture thereof.

32. The process according to claim 30, wherein said acid compound is one selected from carboxylic acid, acid anhydride, sulfonic acid, boric acid, and
5 phosphoric acid compounds, or a mixture thereof.

33. The process according to claim 32, wherein said phosphoric acid compound is one selected from polyphosphoric acid, phosphorous acid, modified phosphoric acid, and phosphate compounds, or a mixture thereof.

34. The process according to claim 30, wherein said phenolic resin compound
10 is one selected from formaldehyde alkylphenol resin compounds, wherein the alkyl is *p*-tert-butyl or *p*-tert-octyl paraffinic group.

35. The process according to claim 34, wherein said alkyl is the polar hetero-atom containing alkyl, and said formaldehyde alkylphenol resin comprises formaldehyde phenol resin having sulfur or oxygen atom containing alkyl.

15 36. The process according to claim 30, wherein said aldehyde compound is one selected from the group consisting of glycidic aldehyde, formaldehyde, binary aldehydes, and furfural, or a mixture thereof, wherein the binary aldehydes are *p*-phthalic aldehyde and its derivatives or *m*-phthalic aldehyde and its derivatives.

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